

A
L E C T U R E,

CONTAINING
PLAIN DESCRIPTIONS

OF

The SITUATION of the large BLOOD-VESSELS
of the Extremities ;

The Instrument called TOURNIQUET ;

AND

The Methods of making effectual PRESSURE on the
ARTERIES, in Cases of dangerous Effusions
of Blood from Wounds, &c.

DELIVERED TO THE SCHOLARS OF THE
MARITIME SCHOOL, AT CHELSEA ;

First printed for their Use ;

And now published for general Benefit ;

By WILLIAM BLIZARD,

Fellow of the Society of Antiquaries ;

Surgeon to the London Hospital, and the Honourable Artillery-Company ;

And Lecturer in Anatomy, and Surgery.

Prodesse quàm conspici.

L O N D O N:

Printed, by J. W. GALABIN,

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M.DCC.LXXXVI.

P R E F A C E.

THE INTRODUCTION, prefixed to these pages when first printed for the use of the scholars of the MARITIME SCHOOL, explains their original design. The publishing them has been frequently urged by men of good sense and benevolence. A passage, in Captain DRINKWATER's curious account of the siege of Gibraltar, expresses strongly the probable utility, and therefore propriety, of such a publication. —

“ September, 1781. The 30th, a soldier of the 72d
“ lost his legs by a shot from Fort *Barbara*. He bore
“ amputation with prodigious firmness; but died, soon
“ after, through the loss of blood previously to his being brought to the hospital. This fact being represented to the governor, the sergeants of the different
“ regiments were ordered to attend the hospital, to be
“ taught by the surgeons how to apply the *TOURNIQUET*; which was afterwards productive of very beneficial

“ neficial confequences. Tourniquets were alfo diftributed to the different guards, to be at hand in cafe of neceffity.”†

Were the knowledge of the fituation of the blood-veffels of the extremities, fo far as is neceffary for checking dangerous effufions of blood, and the ufe of the tourniquet, generally underftood ; not confined to the navy and army, but extended to colleges and fchools, particularly military and nautical academies, manufactories, hospitals of every description, prifons, plantations, fire-offices, the clergymen of parifhes in which are no furgeons, commanders of merchantmen, miners, &c. it could not fail of proving highly beneficial to mankind.

The late Sir BARNARD TURNER would have bled to death, on the fpot of his fatal accident, if compreffion had not been instantly made on the artery of the wounded limb. Laft winter, a poor man, in Cornhill, did actually bleed to death, from a ruptured vefTel in his leg, for want of timely application of a tourniquet. — But the experience of moft perfons could afford

† Vide Drinkwater’s *History of the Siege of Gibraltar*, p. 190.

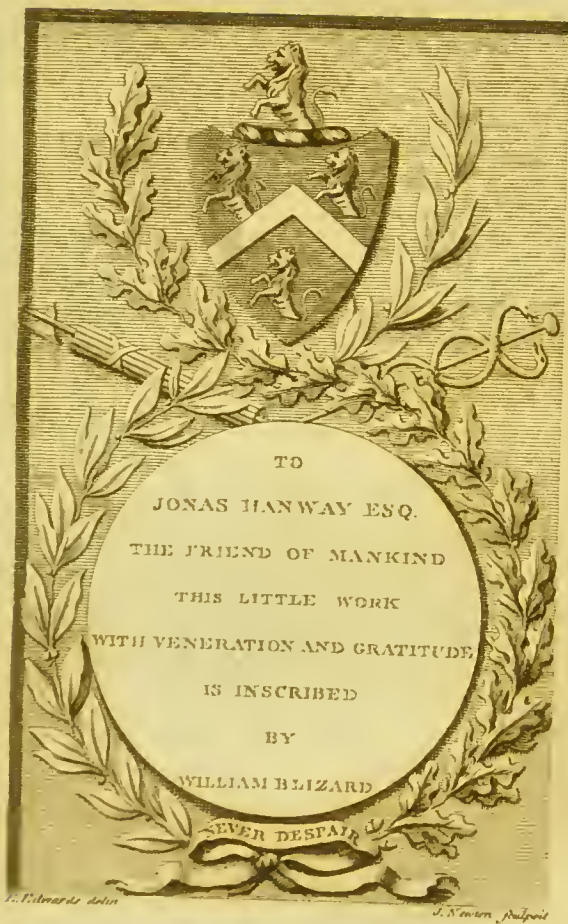
afford some instances of danger or death through defect of this knowledge ; and every surgeon, of an hospital at least, must have known many such lamentable cases.

When a fellow-creature is restored from a state of apparent extinction of life by drowning, rewards are assigned to those who exerted themselves in the recovery. The knowledge of the means proper to be employed on so important an occasion is also, very humanely, generally propagated. Surely, then, if men be in earnest in their endeavours for the preservation of human life, they will admit the importance of the information here recommended ; since there is no doubt that many have fallen sacrifices to ignorance of the means of restraining HÆMORRHAGE.

The familiar form of the Lecture is retained, as the best for general information.

July 30, 1786.

The





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The 26th of February, 1782.

At an Extraordinary General Court of the Governors
of the MARITIME SCHOOL :

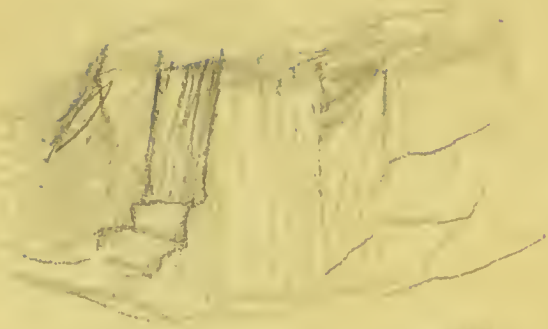
Resolved,

That the Thanks of this General Court be presented
to Mr. BLIZARD, for his genteel Offer of instructing
the Scholars in the Method of applying the Tourniquet ;
which the Governors accept with Pleasure.

By Order of the General Court.

JOHN PUGH,
Secretary.

B I N T R O-



INTRODUCTION.

FROM reflections on my duty, as SURGEON of the MARITIME SCHOOL, and a sincere regard for the objects of my care, I proposed to teach them the situation of the large blood-vessels of the extremities, and the application of the TOURNIQUET. This I attempted, in the plainest manner in my power, in the way of LECTURE, as the most familiar and effectual method of impressing truths on juvenile minds : and it was pleasing to observe the ATTENTION and FEELING expressed in the countenances of my young auditors.

From an anxious wish to promote the great cause of the naval interest of my country, in that essential concern, THE PRESERVATION OF THE LIVES OF SEAMEN, I have now endeavoured to render my Lecture an useful OFFERING to these young warriors.

In the navy and army, cases must continually occur, in which the information it contains is absolutely necessa-

ry for the preservation of existence : but there can hardly be a situation of life, in which, at some period, the knowledge might not prove of equal importance ; and it cannot fail of adding to confidence and courage in the moment of danger.

But knowledge of this kind may be productive of some degree of good, though never *practically* required ; for SCIENCE ever tends to improve the heart, and raise the mind to contemplate the power, wisdom, and goodness, of HIM WHO MADE US !

No professional fame can be acquired from explaining facts known to every student in surgery. This little work must, therefore, be considered as a tribute to HUMANITY ; and, if it should happily prove the means of saving the life or limb of but one brave man, will, I flatter myself, be favourably received.

15th July, 1783.

A L E C.



A
LECTURE, &c.

Young Gentlemen,

AS one of the guardians of your health and lives,
I request your attention, while I point out
what I think may conduce to the preservation
of these blessings when you are launched into the world,
as well as during your residence in this seminary of naval
science.

You are here educated to a profession of great honour,
because of high utility. It is the security of our country,
our religion and laws, our commerce and riches.* The
SEAMAN, then, according to his rank and merit, has a
claim to the respect and care of his countrymen.

You

You are ambitious to become SEAMEN, are ready to join the veteran band, to go forth to fight the enemies of your country ; and therefore merit the esteem and services of your fellow-citizens.

We are excited to attend to the welfare of the BRITISH SAILOR by another consideration.—Trained up in the principles of true honour and bravery, hardy in the practice of them, and properly considering his life as devoted to the service of his country, he is less mindful of bodily evils, and the means of averting them, than the more wary and delicate landsman. He has a title, then, in generosity, to that attention from others, which a martial spirit prevents him from shewing to himself.

I am assured, gentlemen, that, in his majesty's ships, you will have many occasions for the exercise of your judgement and spirit in respect of the health and lives of your men. You must, in almost every case, *reflect for them* ; and, when they find that you are truly zealous in all things for their good, they will obey with more alacrity, will bear you with spirit through all danger, and prove themselves worthy of your generous regard.

regard. — These considerations will, I trust, engage your attention to whatever shall promise benefit to your hardy companions in war.

Every good and brave man would lay down his life in the execution of his duty to his king and country. But, when sick or hurt, he is not to neglect the means of relief which PROVIDENCE has afforded. On the contrary, we are commanded, by divine authority, to preserve our lives and those of our fellow-creatures.

For the preservation of the health and lives of the officers and seamen of his majesty's navy, there are appointed, by government, to each ship of war, a SURGEON, and a certain number of MATES according to the rate of the ship. During the time of action, the station of these officers is in the COCK-PIT. From their necessary confinement to this situation, evils of a very serious nature may sometimes happen; for they cannot possibly render instantaneous assistance to those, in a remote part of the vessel, whose bleeding wounds may urgently require the aid of surgery.

Some of the methods of chirurgical relief are very simple, though of the greatest importance. Of this kind is the making an effectual temporary pressure upon
a part,

a part, to prevent a fatal effusion of blood, in the case of wound, till means of permanent benefit can be employed.

Men of true courage are not dismayed at the sight of blood. In firm possession of themselves on all occasions, they are capable of exercising their judgement, and employing the means with which they are happily acquainted, either to their own benefit or that of others. It is proper, then, that they should have information of whatever is useful, and in their power to execute.

I cannot omit this opportunity, my young friends, of exhorting you to be EXAMPLES of SOBRIETY as well as of the other VIRTUES. What advantage can flow from reason or true courage in a state of intoxication? Many a brave seaman has lost his life from having his mind clouded, by the effects of strong liquor, at the time of receiving a wound.— By TEMPERANCE the body is preserved free from various disorders, and the mind maintained calm and firm, to direct under circumstances of accidents and on every trying occasion.

Induced by these reflections, I proposed, to the wife and good men who direct your education, to teach you the application of the instrument, called *TOURNIQUET*,
employed

employed for stopping the flow of blood from wounded vessels. With their sanction, I have the pleasure of addressing you on this subject, and most heartily wish the instruction may prove useful.

A circumstance has occurred, since I proposed to meet you on this occasion, which has confirmed me in my notions respecting the utility of the intended explanations; and will, I have no doubt, be satisfactory to your governors:

I requested the sentiments of an intelligent naval surgeon on the subject. This was his answer :

“ I can best express my opinion by relating to you the
 “ practice of an ingenious surgeon in the service, and
 “ assuring you that his and my sentiments perfectly
 “ coincide.— Mr. ****, surgeon of the *BARFLEUR*,
 “ had observed, with great concern, the dreadful effects
 “ of wounds that happened in time of action, from the
 “ seamen being entirely ignorant of the manner of ap-
 “ plying the tourniquet, many instances having occur-
 “ red of men bleeding to death, particularly in the tops,
 “ before assistance could possibly be rendered them.—
 “ To prevent these evils as much as was in his power,
 “ he provided every seaman stationed in the tops with a
 C “ tourniquet;

“ tourniquet ; and, on every opportunity, taught them the method of applying it ; so that, in a short time, they became perfectly expert in its use.”

The pious psalmist beautifully exclaims, “ We are fearfully and wonderfully made ! ” It would, indeed, require the study of a long life to learn the little that has been discovered of INFINITE WISDOM in the structure of the several parts of the human body, and of INFINITE GOODNESS in the laws by which they perform their functions to the maintenance of health and life.

It is proper, however, that you should have a general idea of the œconomy of NATURE in the circulation of the blood, to understand the practice that will be laid down, and to enable you to adapt it to particular cases.

“ In the BLOOD is the LIFE of man.” That is to say, this fluid contains the principles of nourishment, and distributes them to every part of the body for its supply and refreshment ; like the water of the great ocean, which conveys the riches and good things of the world to every quarter of the globe.

The HEART is the source of this fluid. It is seated in the breast, a little to the left side, nearly in the center of the body. This organ is hollow for contain-
ing

ing the blood ; and it has the power of contracting and strongly propelling its contents. By this contraction of the heart, the blood is pushed forwards, with an exceedingly rapid current, to the remotest parts of the body ; as the tide of the sea influences and presses on the waters of rivers, observable here in the swelling Thames.

The vessels, or tubes, which proceed from the heart, to convey the blood to all the parts of the body, are called ARTERIES. From the power, with which the heart propels the blood through this system of vessels, it happens, that, whenever they are wounded, the blood flows rapidly and in jerks from the wounded part. They divide, to be distributed to parts, from trunks, like the branches of a tree from the body ; so that, on pressing together the sides of any trunk, the flow of blood into the branches beyond the compressed part is prevented.

The vessels, which return the blood to the heart, are named VEINS. In them the blood receives but little of the impelling force of the heart, and, therefore, moves not with a strong tide, or current, but glides evenly and gently on, like the ebbing water ; and, of consequence, wounds of these vessels are not of much im-

portance : a small degree of resistance, by a finger, or some folded linen, applied to the wounded part, will generally stop the bleeding.

This transmission of the blood from the heart through the arteries, and back to it by the veins, is the CIRCULATION; which, to the honour of this nation, was the discovery of our illustrious countryman, Dr. WILLIAM HARVEY.*

It is very plain, then, that, if a bandage, or ligature, be made sufficiently tight around any limb, the flow of
blood

* The use of the lungs in the circulation is here purposely omitted.
—— The reader, who shall be desirous of enlarging his mind with the principal truths of anatomy and physiology, will be amply gratified in his inquiries. It is to be lamented that this kind of knowledge is not generally pursued as part of a liberal education. The study of the animal œconomy affords the most beautiful and satisfactory ideas, and is calculated to prove highly beneficial to society; for it enables men to distinguish between ignorance and real knowledge, and, consequently, to encourage deserving men, suppress quackery, and advance true medical science. —— The medical books, that are too frequently to be found in the libraries of gentlemen, are likely to produce very different effects. —— The summary accounts of diseases, with receipts for the cure of them, are pillars of the most dangerous empiricism: so far from furnishing the mind with useful truths, they fill it with error, and beget a confidence in ignorance, often fatal to health and life.

blood into all the parts below must be prevented. But, to render this certain, the pressure must be very great in the whole circumference of the limb; and, in some cases, from the situation of arteries between bones, the effect cannot be obtained. To perform this process, therefore, successfully, in cases of wounds and operations, and at the same time to prevent the consequences of an exceedingly strong *general* pressure, surgeons have fixed on certain parts of the TRUNKS of arteries, before their ramification, for the application of a pad, or COMPRESS. — These parts are expressed in the annexed plate.

The PULSE is the beating or distending of an artery, from blood propelled into it by the heart. The spaces of time between the pulsations are periods when the heart itself is filling with blood returned to it by the veins.

Now it is evident, that there can be no pulsation when the flow of blood and distention of an artery are prevented. Where, then, a pulse can conveniently be felt, as in the wrist, the ceasing of it, from a pressure being made on the trunk above, will prove that the pressure is made effectually. To illustrate this by an experiment: — Let a friend feel the pulse in your wrist;

wrist; then apply two or three fingers in *the little pit, immediately below the collar-bone, close to the shoulder, marked a in the plate.* Press strongly, and the pulse will cease, because the artery that supplies the upper extremity *passes under the collar-bone, over the first and second ribs, along this part,* and will be now pressed against one of these ribs. Remove the fingers, and again apply them, and the pulse will be found to alternate with the pressure.

Suppose, then, a wound to be received, an artery of a considerable size cut or torn, and a copious bleeding, in consequence, to happen, in any part of the arm *below the place a* : it appears manifest, that, by making a pressure with the fingers, in the manner described, or assisted by a pad between the fingers and the part, the bleeding would instantly cease. Is not this an useful remark? Let this little process be your first exercise; and, when you are expert in the practice of it, proceed to consider the other places in the limbs where effectual compression may be made, and the instruments proper for the purpose.

The arteries of the upper extremity, or arm, proceed from the trunk at *a*, after this manner : *the trunk passes*
into

*into the arm-pit, deeply situated; it then proceeds along the side of the arm, next the body, obliquely towards the fore part of the joint, or bend, and here divides into three branches. In this course to its division it lies near the bone, and may therefore be successfully compressed. — The situation of this trunk to its division is described in the plate by the lines *b*.*

All compressive means, for preventing a flow of blood from wounded arteries of the upper extremity, must, therefore, be made either at *a*, or in some part of the course of the trunk of the artery, expressed by the lines *b*, between the arm-pit and the bend of the arm.

The distribution of the vessels of the lower extremity is in this way. — The artery passes from the cavity of the belly to the GROIN, where, in thin persons, the pulsation of it may be felt.

At this place, in case of wound and effusion of blood very high in the thigh, effectual compression may be made, by some fingers pressed very strongly, in the manner described for compression below the collar-bone; though it were better to have some kind of strong pad, or firm body, such as will be described, interposed between the fingers and the part,

From

From the groin, the artery proceeds in an oblique direction, downwards and inwards, as expressed by the lines c ; and, at about the middle of the inside of the thigh, expressed by the comprefs d, it lies close to the bone. This is the most favourable part for making a pressure upon it, because of the resistance of the thigh-bone behind. And, where there are opportunities of choice, as in cases of wounds or operations *below* this part, this is the place which surgeons fix on for the application of the compressing body ; it therefore deserves your particular attention.

The course of the vessel is then *downwards and backwards to the HAM ; in the hollow of which, against the lower flat end of the thigh-bone, compression may again be very successfully made in all cases of wounds or operations below the knee-joint.* But *beyond* this part compression must not be depended on ; for, immediately below the joint, the artery divides, like that of the upper extremity, into three vessels, which are situated between the bones of the leg.

You have, I doubt not, anticipated me in a remark on the goodness of the great CREATOR, in ordaining the situation of the larger blood-vessels so that they
 should

should not be exposed to danger in the ordinary and social offices of life.

SCIENCE and HUMANITY allow no distinction of country, but, with equal justice, express the gratitude of mankind to the memory of the authors of useful inventions and discoveries. — The instrument called *TOURNIQUET*, we are informed, was the invention of a *French* surgeon, named MORELL, at the siege of BESANÇON. It consists of four parts: viz. 1. *e*, a yard and half of strong worsted, or other kind of band, an inch broad; 2. *f*, a pad of leather, tightly stuffed with wool or horse-hair, two or three inches long, and of an inch breadth and thickness, having a loop on one side for the band to slide through; * 3. *g*, a piece of strong leather, three inches long and two broad, having two apertures, an inch asunder, for passing the band, or ligature; 4. *h*, a piece of smooth, round, and strong, wood, about four inches in length.

D

Descriptions

* It has been suggested, that, for the use of persons who may not retain an accurate remembrance of the situation of the vessels, it were better for this pad to be made as large again as here described.

Descriptions often fail even in things of great simplicity. This may possibly be the case in the account of the *TOURNIQUET*: but the slightest view will make it understood.* The manner of applying it is this. — Place the pad upon the proper part of the artery to be compressed; bring the band, passed through the loop of the pad, round the limb, and carry the ends through the apertures in the leather; make a double knot with the ends, leaving a space between the knot and the leather that would admit three or four fingers; through this space pass the stick, and with it twist the ligature sufficiently tight to stop the flow of blood through the artery into the limb. The leather, knot, and twisting, are to be placed and made upon the upper part of the limb, nearly opposite to the compress.

It

* It is much to be regretted that this instrument is not generally known, and kept in every family. The price of it is too trifling to be mentioned. — The life of a valuable gentleman in Hartfordshire would have been lately lost for want of it, if a surgeon had not *accidentally* called at his seat in the moment of a dreadful effusion of blood, from a wounded artery in his hand, occasioned by the breaking of a bottle in a fall.

It is manifest that this process, simple as it is, requires both hands for tying the knot ; and, therefore, that you could not apply the tourniquet to your own arm without assistance. It is as plain, also, that it demands a constant application of a hand to the stick, as the ligature would otherwise instantly slacken.

To obviate the necessity of two hands, in regard to the arm, let the ligature be about twelve inches long, and have each end tied in a loop : proceed in its use exactly as already described ; only, instead of making a knot over the leather, pass the stick through the loops at the ends of the ligature, and then perform the twisting.

To fix the ends of the stick, so as to prevent the ligature from untwisting, or the necessity of a constant application of a hand, make a hole through each end of the stick, pass a piece of tape or packthread through each of these holes, carry them round the limb, and tie or pin them. Many other little expedients may be contrived to answer this purpose.

Besides the tourniquet that I have described, there is another, an excellent piece of machinery. The original was invented by M. PETIT, a Frenchman ; but it

was much improved by the late Mr. FREKE, of St. Bartholomew's Hospital. It need only be seen to be understood. The pad *i* being placed upon the artery, and the ligature buckled at *k*, then, by turning the screw, the upper moveable portion, *l*, will be raised from the lower, and, in consequence, the ligature drawn tightly.

The advantages of this instrument are very great. — It may be applied with only one hand ; and, on being fixed, will remain in that state without attention or danger.

Thus the defects of the former instrument are supplied ; and, for every occasion of the use of a tourniquet, *where there is a want of* ASSISTANTS, nothing more useful was ever contrived. The surgeons on-board ships of war, in the hurry of engagement, oftentimes cannot possibly perform their necessary operations so soon as required : by this machine, the bleeding from wounds can instantly be restrained, and then the wounded may safely wait till the surgeons can calmly and properly execute their duty. — Government have wisely directed every ship to be supplied with many SCREW-TOURNIQUETS.

And

And now, young gentlemen, after what has been said of VESSELS and TOURNIQUETS, suppose either of you were wounded by a penknife, or other thing, in the thigh, leg, or arm, and, a large artery being punctured, a violent bleeding should ensue. You have no tourniquet ; but you clearly understand what has been taught on this subject. How, then, would you act ? — Undoubtedly you would instantly pull off your garter, or take the first piece of string or cord you could find ; roll up your handkerchief hardy, and lay it on the trunk of the artery above the wounded part ; pass the garter, or cord, over the handkerchief and round the limb ; tie a knot, leaving a proper space ; and then twist the ligature by a piece of your stick or cane, or any other firm body you could procure.

It may be truly said, that, in any branch of medicine, “ a little learning is a dangerous thing.” My simple design was, to explain to you the means of stopping a flow of blood from wounded limbs, and preventing fatal consequences, *till more effectual aid from surgery be obtained.* It is happy for mankind, that there are professors in this science in almost every town and
village,

village, as well as appointed to his majesty's navy and army.



I F this little Tract should perchance be read by any good man, unacquainted with the MARITIME SCHOOL, at CHELSEA, who may be able and disposed to assist in rewarding the brave defenders of his country in the persons of their rising offspring; in adding strength and dignity to the navy; and truly serving the widow and orphan; let me, with my hand to my heart, direct him to this hospitable, this truly patriotic, seminary, ————— *Thus did I invoke my countrymen to support an institution, whose fall I have now most sincerely to lament. May PUBLIC VIRTUE* and PUBLIC PROSPERITY raise it up again, to remain a monument of regard for those objects that ought to be dearest to ENGLISHMEN!*

